

REMARKS

In view of the above amendments and the following remarks, reconsideration of the rejections contained in the Office Action of March 31, 2004 is respectfully requested.

In order to make necessary editorial corrections, the entire specification and abstract have been reviewed and revised. As the revisions are quite extensive and scattered, the amendments to the specification and abstract have been incorporated into the attached substitute specification and abstract. For the Examiner's benefit, a marked-up copy of the specification indicating the changes made thereto is also enclosed. No new matter has been added by the revisions. Entry of the substitute specification is thus respectfully requested.

In the outstanding Office Action, the Examiner rejected elected claims 118-134 as being anticipated by either the EP'152 reference (European Patent Application 0030152) or the EP'840 reference (European Patent Application 0312840). However, the original claims, including elected claims 118-134, have all been cancelled and replaced with new claims 160-209. In this regard, all of the new claims are directed to an apparatus in which a fluidizing medium is withdrawn from a gasification chamber. Therefore, all of the new claims read on the invention and species elected in the Response filed February 19, 2004. For the reasons discussed below, it is respectfully submitted that the new claims are clearly patentable over the prior art of record.

As explained on page 8, line 18 through page 9, line 1 of the original specification, it is necessary to transfer char produced in a gasification chamber to a char combustion chamber for combusting the char therein. Along with the char, a portion of the fluidizing medium within the gasification chamber also flows to the char combustion chamber in order to provide heat for combusting the char. However, in order to maintain a proper mass balance between the gasification chamber and the char combustion chamber within the gasification furnace, it is necessary to return the fluidizing medium back to the gasification chamber. In conventional gasification furnaces, mechanical devices such as conveyors are used to return the fluidizing medium back to the gasification chamber. However, these mechanical devices often experience problems due to operating in a high-temperature environment, decrease the efficiency of the gasification furnace due to heat loss, and generally increase the cost and complexity of conventional gasification furnaces.

Thus, the present invention as recited in claims 160-209 (including independent claims 160, 172, 184, and 197) has been developed to address these problems.

A description of the present invention will now be provided below with reference to the drawings of the present application. However, reference to the particular embodiments illustrated in the drawings of the present application is provided only for illustrative purposes in order to aid the Examiner's understanding, and is not intended to otherwise limit the scope of the claims.

As shown in Figure 1, the gasification furnace as recited in independent claims 160 and 184 comprises a partition wall 11 separating a gasification chamber 1 from a char combustion chamber 2, and the partition wall 11 has a supply opening 21 located below an interface of a fluidized bed of the gasification furnace to allow a fluidizing medium and char to be supplied directly from the gasification chamber 1 to the char combustion chamber 2. The gasification chamber also comprises a settling char combustion chamber 4 in the char combustion chamber 2, and the settling char combustion chamber has a return opening 25 also located below the interface of the fluidized bed of the gasification furnace. The settling char combustion chamber 4 is shaped and arranged to allow the fluidizing medium to be returned from the char combustion chamber 2 to the gasification chamber 1 by descending through the settling char combustion chamber and passing through the return opening 25 into the gasification chamber 1.

The arrangement described above provides several advantages. For example, the supply opening 21 and the return opening 25 of the gasification furnace allows fluidizing medium to be smoothly transferred between the gasification chamber 1 and the char combustion chamber 2 without the need for any mechanical devices, so as to improve the reliability and the efficiency of the gasification furnace. Furthermore, the settling char combustion chamber 4 makes it possible to raise the interface of the fluidized bed within the settling char combustion chamber 4 as compared to the gasification chamber 1, thereby creating a head difference between the settling char combustion chamber 4 and the gasification chamber 1. This resulting head difference is then used as a driving force to return the fluidizing medium from the char combustion chamber to the gasification chamber 1. Moreover, the settling char combustion chamber allows for better control of the fluidizing medium circulating within the gasification furnace, so as to thereby achieve more stable operation.

The EP '152 reference discloses an apparatus for processing a substance in a fluidized bed, including a first fluidized bed 16 and a second fluidized bed 41. As shown in Figure 1, the EP'152 reference also discloses an entrance port 19 for allowing the fluidizing medium to move from the second fluidized bed 41 into the first fluidized bed 16, and includes an exit port 24 for allowing the fluidizing medium to move from the first fluidized bed 16 back into the second fluidized bed 41. However, the EP '152 reference does not disclose or suggest a *settling char combustion chamber* in a char combustion chamber, which has a return opening located below an interface of the fluidized bed of the gasification furnace. Thus, the EP'152 reference also does not disclose or suggest that such a settling char combustion chamber is shaped and arranged to allow the fluidizing medium to be returned from the char combustion chamber to the gasification chamber by descending through the settling char combustion chamber and passing through the return opening into the gasification chamber. As a result, it is respectfully submitted that the EP'152 reference does not anticipate or even suggest the invention recited in independent claims 160 and 184.

The EP'840 reference discloses a power plant for burning fuel, including a bed vessel 12 having a first section 14 and a second section 16 separated from the first section 14 by a partition 17. As illustrated in the drawing of the EP'840 reference, the partition 17 includes a lower opening 68 for allowing the fluidizing medium to flow from the first section 14 to the second section 16, and includes an upper opening 70 for allowing the fluidizing medium to flow from the second section 16 to the first section 14. However, the EP'840 reference does not disclose or suggest a settling char combustion chamber in the char combustion chamber, in which the settling char combustion chamber has a return opening located below the interface of the fluidized bed of the gasification chamber. Thus, the EP'840 reference also does not disclose or suggest that such a settling char combustion chamber is shaped and arranged to allow the fluidizing medium to be returned from the char combustion chamber to the gasification chamber by descending through the settling char combustion chamber and passing through the return opening into the gasification chamber. As a result, it is respectfully submitted that the EP'840 reference does not anticipate or even suggest the invention recited in independent claims 160 and 184.

Because the EP '152 reference and the EP'840 reference do not, either alone or in combination, disclose or suggest the settling char combustion chamber having a return opening, one of ordinary skill in the art would not be motivated to modify or combine these references so as to obtain the invention recited in independent claims 160 and 184. Accordingly, it is respectfully submitted that independent claims 160 and 184, and the claims that depend therefrom, are clearly patentable over the prior art of record.

Independent claims 172 and 197 are directed to a gasification furnace similar to the gasification furnace recited in independent claims 160 and 184. However, instead of a settling *char combustion chamber*, independent claims 172 and 197 recite that the gasification furnace comprises a settling *gasification chamber* in the gasification chamber, and that the settling gasification chamber has a supply opening located below an interface of a fluidized bed of the gasification furnace. Furthermore, the settling gasification chamber is shaped and arranged to allow a fluidizing medium and char to be supplied from the gasification chamber to the char combustion chamber by descending through the settling gasification chamber and passing through the supply opening into the char combustion chamber. In addition, a partition wall separating the char combustion chamber from the gasification chamber has a return opening located below the interface of the fluidized bed of the gasification furnace for allowing the fluidizing medium to be returned directly from the char combustion chamber to the gasification chamber.

As a result of the arrangement described above with respect to independent claims 172 and 197, fluidizing medium can be returned to the gasification chamber without the need for any mechanical devices. Furthermore, the settling gasification chamber raises the interface of the fluidized bed within the settling gasification chamber as compared to the char combustion chamber. Thus, a head difference between the fluidized bed of the settling gasification chamber and the fluidized bed of the char combustion chamber is produced, and this head difference creates a driving force for moving the fluidizing medium and char from the gasification chamber into the char combustion chamber, so as to improve the circulation within the gasification furnace. In addition, the settling gasification chamber allows for better control of the fluidizing medium circulating within the gasification furnace, so as to thereby achieve more stable operation

As explained above with respect to independent claims 160 and 172, the EP'152 reference discloses a first fluidized bed 16 and a second fluidized bed 41, along with an entrance port 19 and an exit port 24. The EP'840 reference, meanwhile, discloses a bed vessel 12 having a first section 14 and a second section 16 separated by a partition 17. However, the EP '152 reference and the EP'840 reference do not, either alone or in combination, disclose or suggest a gasification furnace that comprises a *settling gasification chamber* in a gasification chamber, in which the settling gasification chamber has a supply opening located below an interface of a fluidized bed, as recited in new independent claims 172 and 197. Therefore, it is respectfully submitted that neither the EP '152 reference nor the EP '840 reference anticipates independent claims 172 or 197. Furthermore, because the references do not even suggest a settling gasification chamber, one of ordinary skill in the art would not be motivated to modify or combine these references so as to obtain the gasification chamber as recited in independent claims 172 and 197. Accordingly, it is respectfully submitted that new independent claims 172 and 197, and the claims that depend therefrom, are clearly patentable over the prior art of record.

In addition to the distinctions discussed above, the Examiner is requested to note that new independent claim 184 also recites that the gasification chamber is operable to generate an internal revolving flow of the fluidizing medium, and that new independent claim 197 also recites that the char combustion chamber is operable to generate an internal revolving flow of the fluidizing medium. As a result of these features, circulation of the fluidizing medium within the gasification furnace is further improved, so as to further improve the efficiency of the gasification furnace. Furthermore, these features are also not disclosed or suggested in the EP' 840 reference or the EP '152 reference.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance. However, if the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact the Applicant's undersigned representative.

Respectfully submitted,

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